update

UNITED NATIONS CENTRE FOR SCIENCE AND TECHNOLOGY FOR DEVELOPMENT

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Global Warming and the Taming of a Villain

Coal burning and the atmospheric pollution caused by emissions of carbon dioxide, (CO_2), sulphur, nitrous oxides and methane have cast this prime energy source as a villain in the global warming debate, and rightly so. Carbon dioxide is the principal 'greenhouse' gas and the burning of coal is a major source, equal to some 40 per cent of the global CO_2 emissions from fossil fuels.

The problem, however, will not be solved quickly or without significant costs for those developing countries which are dependent upon coal to drive their industries and provide home heat and cooking fuel. Coal is the primary source of 41.3 per cent of the total energy used in the developing world, and the bulk of it is burned without processing or cleaning. It will take time to make the transition to options which are less damaging to the environment.

Available options

The good news, however, is that clean coal technologies are already available, eminently transferable, and welcome in major coal consuming countries such as China and India. Both share the outside world's concerns about global warming, acid rain and groundwater pollution.

Damage caused by the mining and unclean combustion of coal is painfully evident locally in urban smog and respiratory ailments, in the acid rain which corrodes infrastructure and is killing forests, in the slag heaps which occupy precious agricultural land, and in the seepage of wastes to the underground water table. Policy makers do not have to be convinced of the need to seek out alternatives. The main question is how best to get the job done at an affordable cost. In this respect there is more good news: more efficient consumption and major economic savings are inherent in clean coal technologies which could usher in an era of higher productivity without the environmental pain.

From 2-6 December, China hosted the first of three "Clean Coal" conferences organized jointly by the State Science and Technology Commission of China and CSTD to gather information for a consolidated position on the United Nations Conference on Environment and Development which will be held in Rio de Janeiro, Brazil, in June 1992. The China conference was prepared in cooperation with UNFSTD, ESCAP. Other major participants included the Asian Development Bank (ADB) and the Federal German Ministry for Economic Cooperation (BMZ) of Germany.

The second conference will be held in

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ATAS News Supplement

Women and Science

One of the contradictions of social progress is that women are frequently the last to benefit from scientific or technological improvements. In fact, the health and livelihood of many millions of women are often jeopardized by changes which male policy-makers perceive to be 'in the public interest'.

Evidence of social disruption can be found at opposite ends of the technological spectrum: In Asia, where women in high-tech industries are exposed to contact with hazardous chemicals, and in Africa, where agricultural technologies designed to reduce the workload of women in farming and food processing, are given to men, effectively jeopardizing the social status and income-earning prospects of the women thus displaced.

These and other negative side effects of 'progress' usually have their roots in

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Taming a Villain
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India (Madras, 14-18 January), and the third is scheduled for April in the Soviet Union. A round-table conference to consolidate the findings of these meetings has been jointly organized by CSTD and the German Foundation for International Development (DSE), and will be held in Düsseldorf at the middle of May. The meetings in China, India and Germany were organized with financial support from the BMZ.

The examples and options outlined at these conferences could have a significant impact on the shape of the global energy debate as the international community focuses more intensely on the threat of global warming. Although developing countries share the environmental concerns voiced by their industrialized neighbours, many have relatively fewer options when considering ways of balancing their rapidly growing need for energy against pollution caused by readily available and affordable sources such as coal.

The demand for electricity in the developing world is expanding at an average annual rate of 7.6 per cent. The World Bank estimates that developing countries will install new plants capable of generating an additional 384,000 megawatts in the 1990s and that coal will provide 45 per cent of the prime energy. ■

China Coal Conference Urges Global Partnership

Developing countries such as China are greatly dependent on coal as a source of energy and have no alternative but to increase their coal use to fuel economic growth and development for the foreseeable future. They have limited technological and managerial opportunities to contain the environmental damage caused by the burning of unclean coal as they pursue higher living standards for their people, and can only hope to meet globally acceptable standards of consumption if they have access to the environmentally sound coal technologies now available in the industrialized world. A new scientific partnership between the developing and industrialized countries, coupled with mechanisms to fund the transfer of environmentally-sound coal technologies, are essential ingredients for progress towards sustainable development.

These are among the main conclusions of the international conference on clean coal technologies held at Beijing from 2-6 December.

The conference recommended, among other things, that:

- industrialized and developing countries negotiate an equitable solution to vast disparities in per capita energy consumption and the potential of developing countries to respond to global environmental concerns;
- industrialized countries help poorer countries to manage technological change and minimize the environmental impact of increased energy production;
- all countries cooperate in the development of a global energy production strategy, which relates to coal-based energy in particular;
- the lending policies of multilateral and bilateral institutions should provide special incentives for investment in clean coal technologies;
- an Asian coal technology centre should be established to sponsor and coordinate research on clean coal technologies;
- developing countries should introduce environmental regulations as a spur to technological innovation as well as for the protection of the environment. ■

Third in World

China is a major coal producer and the third largest coal consumer in the world after the United States and the Soviet Union.

Coal is used to generate 75 per cent of the nation's primary energy and most of it is burned directly. Less than one third is transformed into more efficient, or cleaner burning fuels.

China's annual coal output is expected to reach 1,400 million tons by the turn of the century — a figure which could have alarming consequences for the health of the domestic environment unless present modes of coal use are changed. A contingent of 84 national universities, colleges and research institutes are currently involved in efforts to do just that. ■

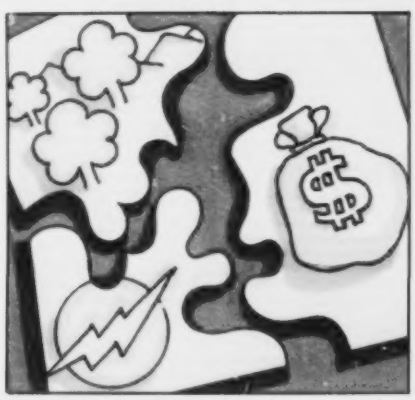
Women and Science
(Cont. from Pg. 1)

the unequal access of women to education, land and extension services, and their exclusion from decision-making processes.

The Centre for Science and Technology for Development (CSTD), in partnership with developed and developing countries, is undertaking a series of pilot projects on endogenous capacity building which will address, among other things, the impact on women when new technologies are introduced to a community. CSTD is working with a number of developing countries to help establish policy dialogues which address the role, the potentials and the possible impact of science and technology on all the stakeholders in national economies.

One proposal, in the context of women, is that Governments:

- assess the actual or potential impact of technological change on selected groups of women in urban and/or rural settings;
- assess women's access to land, raw materials, knowledge, technology, training, credit, extension services and other means of raising their status;
- examine women's involvement in decision-making processes;
- include women in policy dialogues on the role of science and technology in national development. ■



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GTZ Project Advises on Rational Use of Energy in China

The Chinese metallurgical industry is one of the most intensive and least efficient energy users in the country and was the subject of a pilot project on the "Rational Use of Energy" initiated in the early 1980s with the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GMBH of the then Federal Republic of Germany.

GTZ noted that many of the energy and environment-related problems experienced in China were "typical of the energy situation of the newly industrialized countries in Asia and Latin America." It found in 1984 that the average energy consumption of coal-heated furnaces at a Ministry of Metallurgy plant in Xian was 1.9 tons of coal per ton of finished product — four times the international standard. Measurements showed that the major coal-fired furnaces were burning at 10 per cent efficiency. GTZ reported also that government subsidized coal was trading at less than one third the going international rate.

GTZ identified a wide range of technological (coal gasification), managerial and policy measures by which the country could save between 55 and 60 per cent on its energy consumption without compromising economic growth.

Over the years, GTZ has also developed Rational Use of Energy Programmes in Thailand, the Philippines, Costa Rica, Colombia, Ecuador, Sudan, Burkina Faso and Mali. New projects are being planned in Argentina, Chile and India. ■

GTZ

Energy loss from leaky furnace door - China

China Endorses Sustainable Development Goals

China could not afford a "business-as-usual" approach to energy consumption, Madame Deng Nan told delegates to the international Clean Coal Conference held at Beijing in December.

Madame Deng said that if the country pursued its current plans to quadruple GNP from 1980 levels by the year 2000 without a parallel effort to use cleaner sources of energy, the environmental pollution would be "unbearable". Madame Deng, Vice Chair of China's State Science and Technology Commission (SSTC), said that within the bounds of state resources, technology and financial ability China was effectively promoting "the harmonious development of our energy, environment and economy, in order to make our own contributions to the global environmental protection, which is a matter of concern to the whole human race."

Madame Deng acknowledged that China's population (1.1 billion people in 1990), coupled with its ambition to attain the living standards of today's middle-level developed countries by the middle of the next century, had major implications for the environment. But she also said that while China's emissions of carbon dioxide ranked third in the world today, the country's per capita emissions were only one tenth of those of the United States. She said that the inefficiency of China's present energy supply structure and the global availability of technologies for cleaner coal consumption, and the exploitation of hydropower, nuclear power and natural gas, offered scope for major advances in national energy supply and conservation, but added that limited national resources inhibited their dissemination in developing countries such as China. She urged the international community to establish mechanisms which would support the economic growth of developing countries without jeopardizing the global environment. A major element of such an approach, she said, would include the transfer of advanced energy technologies "on favourable or non-commercial terms." ■

Asian Coal Centre Proposed

The Beijing conference recommended that an Asian centre should be established to coordinate and promote the use of clean coal technologies.

It was proposed that the centre could, among other things:

- sponsor R&D for clean coal technologies;
- disseminate information on the development and adaptation of clean coal technologies;
- support the demonstration of new coal technologies at selected third world sites;
- assist in technology transfers;
- provide energy management training in developing countries.

It was suggested that the centre function either as an independent unit or as an adjunct to an existing institution. ■

A New Coal Age

Most of the technologies currently used to produce energy from coal were developed in the 1950s and 1960s and are approaching the limits of their effectiveness. The efficiency of coal-steam power plants has risen over the past 85 years from around 10 per cent to 35 per cent without addressing the associated generation of pollution which has become chronic in many coal-dependent communities.

A new generation of coal technologies has emerged in Europe and the United States since the 1980s however, raising the prospect of a new coal age with efficiencies in the range of 40 to 45 per cent and emission reductions in the case of CO_2 by up to 30 per cent. Some of these clean coal technologies have the potential to make a coal-fired plant burn as cleanly as natural gas — the cleanest of all fossil fuels.

These "clean coal technologies" can be installed at various stages in the fuel chain or used to convert coal into other, more efficient and environmentally sound fuel forms as follows:

Pre-combustion: Sulphur, methane and other impurities can be removed before coal reaches the boiler. Research has traditionally focused on two major approaches: physical cleaning and chemical cleaning. One chemical process which has shown promise is molten caustic leaching which removes sulphur and mineral matter. Biological cleaning, employing microbial and enzymatic techniques to liberate sulphur and ash, has also attracted recent interest.

Combustion: Two new advanced technologies remove pollutants as the coal is fired. They are fluidized bed combustion and advanced 'slagging' combustion.

Post combustion: Flue gases can be cleaned in the ducting which leads to the smokestack or in advanced versions of today's scrubbers.

Conversion: A fourth option outside of the fuel chain is the conversion of coal into other fuel forms. There are five categories of conversion:

• Gasification: Coal is broken into gaseous molecules by bringing it into contact with high temperature steam and oxygen (or air). The gases are purified and the clean gases are burned. The very hot exhaust is routed through a gas turbine to generate electricity and the residual heat in the exhaust is used to boil water for a conventional steam turbine generator to produce more electricity.

• Mild gasification: This modification produces gaseous, solid, and liquid products by heating coal in an oxygen-free reactor.

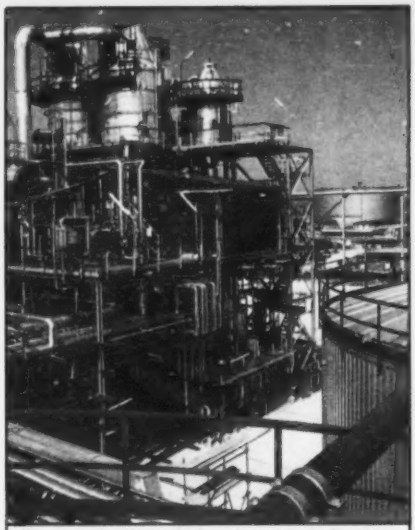
• Coal liquefaction: Coal-oil co-processing is a recent development in liquefaction technology which could offer better economies. Rather than liquefy coal alone in a complex and expensive process, coal can be mixed with heavy residual oil waste from refineries. The slurry is processed in a cracking unit and sulphur and ash can be removed before the coal-based liquid is used as fuel.

• Fuel cells: The fuel cell is a coal-based technology which does not depend on combustion processes. Gasified coal is used as a source of hydrogen to supply the fuel cell for an electrochemical reaction. During this reaction, oxygen atoms and hydrogen from the hydrocarbon fuel are combined to form water, thus releasing chemical energy. Japan, the United States and Germany are leaders in the R&D of fuel cells.

• Magnetohydrodynamics (MHD): This process fires coal at close to, 5000 °F. The combustion gases are released as a hot stream of highly charged particles (plasma). The electrical conductivity of the gases is enhanced by 'seeding' them with special salts, and the plasma is channelled through an intense magnetic field at close to the speed of sound to generate electricity.

Clean coal technologies have primarily been geared towards the utility and industrial markets but most are capable of providing energy and/or fuel for all market sectors. There is a wide and expanding array of options at various stages of development, and while some involve the construction of new plants, others can be retrofitted to existing utilities. ■

This article was extracted from a CSTD background report "The State of the Art of Clean Coal Technologies" which was produced for the China conference by Professor Wang Xinhua, a Visiting Scholar at the U.S. Office of Technology Assessment.



Flue gas desulphurization plant - Austria

Agricultural Conference in Bangkok

The Asian Association for Agricultural Engineering has invited senior researchers, scientists, extension workers and planners to an international conference to be held in Thailand from 7 to 10 December.

The conference will address a wide range of subjects including: farm power and machinery, post-harvest technology and biotechnology, soil and water engineering, irrigation systems management, drainage engineering, agrometeorology, energy in agriculture, agricultural systems engineering, structures and environment, electronics in agriculture, agricultural waste management, agro-industry, graduate education in agricultural engineering, ergonomics, terramechanics, standards and safety, new materials, and emerging technologies.

The conference is being organized by the Division of Agricultural and Food Engineering in collaboration with the Agricultural Land and Water Development Programme of the Asian Institute of Technology (AIT). It will be held on the AIT campus some 42 km north of Bangkok.

Inquiries should be addressed to: The Asian Institute of Technology, GPO Box 2754 Bangkok, Thailand. Fax: 66-2-5162126. ■

ATAS News

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Hanoi Workshop on Biotechnology

As the fruits of biotechnology find their way into the global marketplace, developing countries are realizing that they must find a niche and join the race, or be trampled by the crowd.

The challenge for these countries in the realms of agriculture and food processing is enormous, extending far beyond the most obvious question of technological capacity to include such issues as the environment, industrial processes and the impact of product substitution on trade. It also includes such things as land use and distribution, the application of appropriate agricultural machinery, pricing and marketing, and the adequacy of government policies and support for institution-building. Sound technology assessment is essential if countries are to keep these and other issues in perspective and to avoid the most negative impact of rapid technological change.

J. Ferchak - ATI

Building on biodiversity - Indonesia

Advantage

Developing countries have one particular advantage in all of this, and that is the richness of their natural resource base and its biodiversity. The variety and depth of their genetic resources is central to the science of biotechnology and presents a window of opportunity to develop indigenous technologies which will expand horizons for their agricultural production.

Researchers from Asia, Europe, North America and Latin America met at Hanoi, Viet Nam from 9 to 12 December with Vietnamese scientists and policy-makers to assess the potential impact of biotechnology on food production. The workshop aimed to identify policy options for biotechnology capacity building and sought to identify priority measures which could be pursued by the public sector and a newly emerging private sector. The workshop was jointly organized by the State Committee of Science and Technology of Viet Nam and CSTD with the financial support of FSTD. It was attended by representatives of the Government of Viet Nam, bilateral and multilateral aid agencies, and NGOs.

Among the main conclusions and recomendations were the following:

To policy-makers:

- the National Council on Biotechnology should be strengthened by the establishment of a centre for genetic engineering and biotechnology and a National Centre of Excellence which would help to attract international donor funding, high-level scientific exchanges, training for nationals and collaboration;
- a system of quality control and standards should be established both for domestic consumption and for the development of competitive export products;
- the private sector must play a larger role in new product development and pricing policies and tax incentives must be introduced to stimulate farmers and other producers.

To researchers:

- agricultural biotechnology should complement traditional approaches in such areas as plant breeding and agronomy;
- *in vitro* propagation and the micropropagation of high-value products, are the most important near-term opportunities to develop virus- and pathogen-free plants of improved quality and yield;
- great potential exists for the production of mushrooms, bio-fertilizers and bio-pesticides;
- in the medium and long term, biotechnological research should concentrate on the upgrading of existing technologies and should focus on products such as ethanol, citric acid, acetic acid and enzymes, which have a high value added;
- particular attention should be paid to the identification of indigenous crops which can yield a high added value in medicinal and aromatic products.

To extension workers and farmers:

- means of transferring new technologies to field workers and farmers should be strengthened.

To commercial enterprises:

- market studies should be used to make new product selections based on production costs and comparative advantage, among other factors;
- biotechnology extension services should be used to establish links between research and the productive sector;

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Hanoi Workshop
(Cont. from Pg. 1)

- guaranteed supplies of spare parts are essential for successful industrial production;
- short term priority should be given to protein supplies for the general population through the production of fish sauce, lysine, and the processing of legumes. Medium- to long-term attention should be paid to the production of specialty chemicals, including ethanol, acetic acid, citric acid, sugar from starch, and enzymes;
- special attention should be given to markets for fermented foods in the ASEAN region, the United States, Japan, and the European Community.

International assistance

The workshop urged bilateral and multilateral organizations to support Viet Nam's efforts by exchanging information, germplasm, genetic materials and scientists, and by helping to organize workshops and seminars, training opportunities and study forums. International organizations were also asked to help in the formulation of policies and strategies, and with the acquisition of equipment and materials. It was noted that Viet Nam lacked export market experience and that joint ventures with regional or multinational enterprises should be explored as a means of gaining experience of and access to foreign technology. ■

A Greenhouse Dilemma - Rice Versus Methane

The impact of rice cultivation on global warming is the subject of a study currently under way at the International Rice Research Institute (IRRI) at Los Banos, Philippines.

The flooded fields in which 95 per cent of the world's rice is grown, emit 25 per cent of the methane which enters the atmosphere annually, according to Dr. H.U. Neue, coordinator of IRRI's methane research programme. "But farmers cannot quit growing rice to reduce methane emissions," he said. "Rice is the world's most important food crop. It provides more than half the daily food for one out of every three persons on earth."

A partnership

Soil and atmospheric researchers have joined forces at IRRI to measure methane emissions under varying fertilizer regimes as part of a five-year study of how climate change might affect the world's rice crop and vice versa.

Methane is produced by the bacterial decomposition of organic matter in flooded rice soils and enters the atmosphere by three routes. As much as 80 per cent passes from the roots through the plant which acts as a 'chimney'. Smaller amounts bubble up to the water surface or diffuse slowly from the soil through the water. Most of the diffused methane however is broken down in the soil and floodwater and never reaches the atmosphere.

How and why

"We are interested in the how and why of methane emissions from flooded rice fields," says Mr. Hugo Denier van der Gon, a research fellow from the Wageningen Agricultural University of the Netherlands. "We don't want to change the system without first understanding it."

Methane has assumed a high profile in the global warming debate because of its heat trapping properties. Although the methane concentration in the upper atmosphere is only 1.7 ppm compared with carbon dioxide (CO_2) at 350 ppm, a single methane molecule traps heat 30 times more effectively than a CO_2 molecule and may cause about 15 per cent as much global warming as does CO_2.

Options

"Changing from irrigated lowland rice cultivation to dry upland farming won't solve the problem," says Dr. Neue. "Even without rice cultivation, much of the wetland areas would be naturally flooded and methane emission is a natural process in flooded soils. Any fertile submerged soil will produce methane. Our aim is not to decrease methane production, but to decrease methane emissions."

Dr. Neue said that increased methane oxidation in the fields would mean less escaping gas. "We need a plant with both high oxidation power and high yield potential. A plant that will help the environment without endangering farmers' income."

IRRI scientists have placed 16 plexiglass boxes each 1 cubic metre in size in small plots with rice exposed to different fertilizer treatments (see photo). The boxes open and close, trapping and continuously measuring the methane emitted. Methane emissions from different rice varieties and under different water management practices will also be measured. ■

IRRI

Dr. Neue (Left) explains IRRI's methane measuring system

Global Assembly Recognizes Role of Women

A Global Assembly held recently at Miami, Florida, reminded the international community that women in the developing world have a critical role to play as managers of the environment.

More than 400 delegates from every region heard some 300 success stories about women who had made a difference by developing products, technologies and community systems which were environmentally friendly.

In much of the developing world, women cultivate most of the food crops, are responsible for domestic water supplies, and gather most of the fuel. The majority of these women are also poor. They are rarely consulted on matters of critical importance to the environment and they are commonly ignored by Government and other agencies. Although they could have a profound impact on national productivity and development, they seldom receive technologies and knowhow which could lighten their workload and boost their output.

Delegates to the Assembly were reminded that women, representing 50 per cent of the population, wielded enormous power as producers and consumers. They could determine energy use, and influence the protection of natural resources and the disposal of wastes. Policy-makers however, tended to ignore their needs and their potential to reshape the environment locally and globally.

Mrs. Sharon Capeling-Alakija, Director of the United Nations Fund for Women (UNIFEM), likened the situation of women today to the marginal position of scientists who pioneered the machinery and processes which shaped the modern industrial world. "They were viewed with deep suspicion", she said. "They were held at arms length, confined to the margins of the economy and decision-making processes. Even today, the scientific and political communities have difficulty communicating."

Mrs. Capeling said that science prevailed however because the scientists and thinkers positioned themselves in important places where they could make themselves heard. "They trained a labour force to speak their language and to understand their principles. And they applied science and technology to human productivity and the solution of socially significant problems," she said.

Mrs. Capeling said that although modern science had frequently ignored indigenous knowledge and women's interests, women could learn something from the progression of scientists into the economic mainstream.

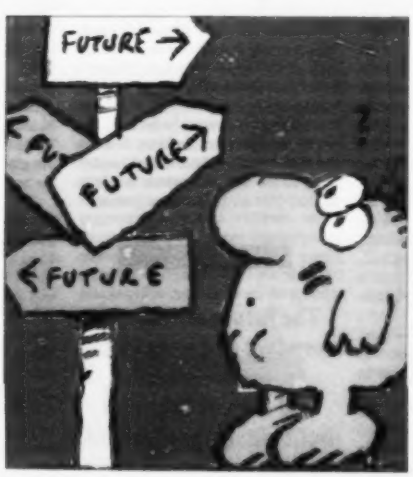
She said that as long as third world politicians and statisticians mostly ignored the role of women in their societies and failed to measure their productivity in cash terms, many millions of women would effectively remain "invisible" — without land or tools to boost their productivity. Meanwhile, women had become both agents and victims of environmental degradation, living by their wits in fragile eco-systems where over-farming, over-grazing, and the destruction of forests for fuel were a natural consequence of poverty and the daily struggle for survival.

"People who are poor, hungry and desperate, have little time to ponder the long-term consequences of their actions," she said. "They do whatever they can to satisfy their immediate needs."

Mrs. Capeling said that women in difficult circumstances had surmounted poverty in the past and would do so in the future if only Governments would recognize and support their contributions to economic development. She urged women attending the Assembly to develop their success stories into models which could be shared and replicated.

"Where we appear to be weakest, is in our ability to convince policy-makers that women do indeed have solutions to social problems," she said. "While we claim that development will occur more rapidly and effectively if women are integrated into all areas of human endeavour, we have had only limited success demonstrating that point. As yet we have only a few models, a few effective strategies which others might replicate. We have yet to establish many of our experiences as fact.

"We must give more support and exposure to innovation through expanded programming. We need to disseminate new technologies and techniques more widely. We have to be more vigorous in our campaigning for legal, social and political change." ■



Compressing Development

Dissemination, assimilation and innovation have greatly compressed the development prospects for much of the developing world.

Mr. Abdul Rashid, Deputy Technological Adviser to the Ministry of Science and Technology of Pakistan, noted recently that the technological capabilities which the United Kingdom achieved after 200 years of invention, were matched by the USA and the UK in about half that time through good management and innovation.

"Japan accomplished the same status in less than 60 years, while the newly industrialized countries, such as South Korea, Taiwan, Hong Kong and Malaysia, are now catching up in most fields in a span of 30 to 40 years, merely by the assimilation, improvement and development of technology," he said. Mr. Rashid was speaking in Washington, D.C., at a November workshop on Technology Assessment for Developing Countries.

"The export earnings of South Korea have increased manifold and exceeded $60 billion in 1989," he said. "Japan has

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Compressing Development
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become the leading manufacturer of automobiles in the world, while Malaysia has become one of the largest manufacturers of integrated circuits and other electronic components."

These and other rapidly industrializing countries in South East Asia had shown the way for others, he said, by proving that a systematic application of technology could bring economic prosperity in the shortest possible time.

Speaking at the same workshop, Mr. Alan L. Porter, Professor of Industrial and Systems Engineering at the Georgia Institute of Technology, complimented CSTD for its efforts to develop technology monitoring, forecasting and assessment (TMF&A). He said that the United States, as a pioneer in technology assessment, had been much more narrowly focused. Mr. Porter said that although the Office of Technology Assessment was concerned with TMF&A, its activities were confined to "a narrow Congressional niche." By contrast, he said, the Government of China had positioned TMF&A much closer to policy-making with the State Science and Technology Council "straddling" the Ministries.

Mr. Porter suggested that:

- technology assessment in developing countries should be cast in the comprehensive light of TMF&A;
- TMF&A capabilities be nurtured, actively networked, and linked to policy processes;
- TMF&A studies be "crafted" according to individual user needs, resources and constraints.

The workshop was jointly organized by CSTD and OTA. ■

Opportunities For Training

The U.S Geological Survey (USGS) has announced two courses for the first half of 1992. They are an international course on "Understanding Earthquakes and Mitigating Their Effects" (20 April – 7 May), and an introductory course in the fundamentals and applications of remote sensing and GIS (6-31 July).

Since the 1940s, USGS has provided training and research opportunities for more than 4,000 international earth scientists, either at its headquarters in Virginia, or through other institutions in the United States. A feature of its courses is the opportunity for on-the-job postgraduate studies using state-of-the-art equipment and methodologies.

For further information, please write to U.S. Geological Survey, 917 National Centre, Training Section, Reston, VA 22092, USA. ■

Solar Meeting in Harare

A conference on the application of solar energy in developing countries has renewed the call for establishment of an international renewable energy agency. The conference, held in Harare, Zimbabwe (14-17 November) was organized by the United Nations Solar Energy Group on Environment and Development in cooperation with African and European non-governmental organizations (NGOs). It was hosted by the Government of Zimbabwe and attended by 160 solar energy experts from 22 countries.

According to a 10-point declaration adopted in Harare, the proposed renewable energy agency should support and promote solar technology transfers as well as development of the infrastructure for research, development, education, training and the production of solar energy.

NGOs which helped to organize the conference included: the Friedrich Ebert Stiftung Foundation of Germany, the European Solar Energy Association (EUROSOLAR), the OEKO-RISE 700 of Switzerland, and the Solar Energy Society of Zimbabwe. ■

Cash Poor but Capable

Cash poor developing countries would do well to focus on energy efficiency and the rehabilitation of existing power plants before attempting to finance the construction of new electrical generating capacity. This was the broad consensus of energy experts who gathered in Stockholm, Sweden, for a United Nations sponsored energy consultation in November.

Their basic message was that third world demand for electrical energy over the next two decades would outstrip the combined financial capacity of governments and aid agencies — bilateral and multilateral — to deliver new plants. But no one should be unduly alarmed. Supply-side efficiencies could bring additional capacity at costs far below those associated with new construction.

It was generally agreed that the privatization of public utilities, tariff reforms and the development of independent private generation facilities similar to those currently being pursued in Latin America and in northern and southern Africa would not only satisfy demand but could reduce carbon dioxide emissions from power plants by more than 50 per cent.

The meeting, which was attended by 60 officials and energy experts from developed and developing countries, was sponsored by the United Nations Development Programme (UNDP), the British Overseas Development Administration, the German Bundesministerium für Wirtschaftliche Zusammenarbeit, the Netherlands Ministry of Foreign Affairs, the Swedish Agency for International Technical and Economic Cooperation, and the United States Agency for International Development. ■

ATAS News is a regular supplement to the *Update* newsletter of the UN Centre for Science and Technology for Development (UNCSTD). Its objectives are to inform scientists and planners of CSTD's activities in technology assessment (TA), to serve as an information medium for the ATAS Technology Assessment Network (TAN) and to highlight the implications of new technologies for developing countries. *ATAS News* offers readers an open forum to address these and related issues at the national, regional and international levels. Submissions for publication are welcome.

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ATAS News is edited by Ian Davis. ■

Commonwealth Ministers Focus on Technology

Ministers of Finance from 50 Commonwealth countries ranked scientific and technological capacity high on their list of priorities when they met at Kuala Lumpur, Malaysia, last October. The countries, which have a cooperative working arrangement through a "Commonwealth Consultative Group on Technology Management" (CCGTM), emphasized, among other things:

- the scope for developing countries to help each other in the transfer, adaptation and management of technology;
- the need for science and technology financing mechanisms in their budgetary systems;
- the need for better integration of science and technology into economic policy-making.

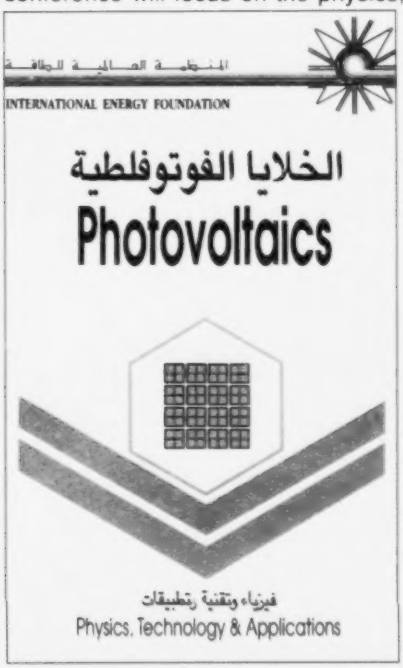
The CCGTM was established in 1989 to improve the Commonwealth countries' capacity to manage technological change and respond to the needs of member countries which were of different sizes and at different stages of development.

The Group operates through a consortium of about 200 members who are senior science and technology managers, economists, planners, environmentalists, lawyers and engineers, from the private and public sectors. The Group focuses on the problems of individual countries through workshops, seminars, information networking and skills development.

For further information please contact Michaela Y. Smith, Programme Manager, CCGTM Support Unit, Commonwealth Secretariat, Marlborough House, Pall Mall, London SW1Y-5HX, United Kingdom. ■

International Energy Foundation

The International Energy Foundation (IEF) will host a conference on photovoltaics at Tripoli, Libyan Arab Jamahiriya, from 9 to 13 July. The conference will focus on the physics, technology and applications for photovoltaics.



The IEF is a non-profit organization which focuses on all forms of energy in all geographical locations. Its stated objectives are to:

- help less developed countries obtain reliable sources of energy;
- promote discussion and an international exchange of information on all aspects of energy;
- establish an international energy library and data bank;
- provide advanced education scholarships;
- make awards for outstanding achievements in the energy field;
- recommend standards to national and international associations;
- prepare global energy reports;
- raise funds to meet IEF objectives;
- co-ordinate activities connected with Energex conferences - the first of which was held at Tripoli in 1988.

For further information about the IEF and the July conference please contact Dr. M.A. Muntasser, President, the IEF, P.O. Box 83617 Tripoli, Libyan Arab Jamahiriya. Fax: 31831. ■

Acid Rain Study Proposed for Asia

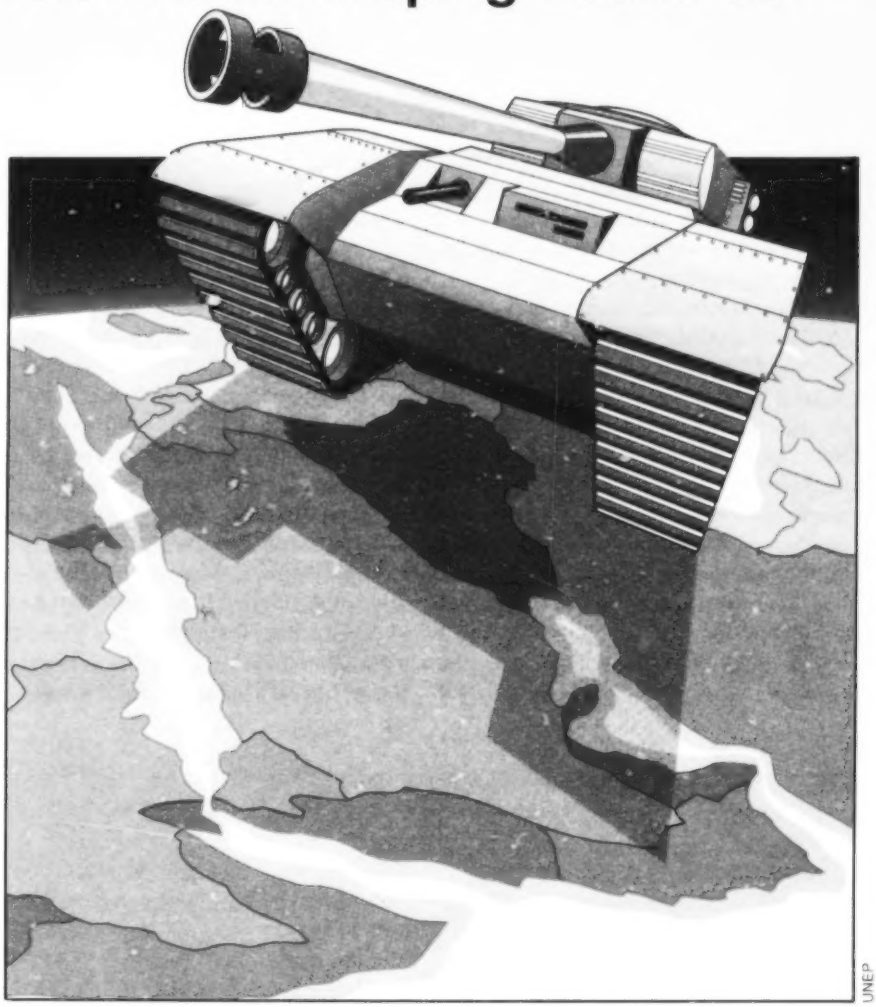
By the year 2010, the total projected sulphur dioxide emissions from Asian countries will exceed those from North America, Eastern and Western Europe combined.

According to the World Bank, the local and regional implications are serious, given that sulphur and nitrogen oxides can be driven hundreds of kilometres from the source and fall as acid rain in neighbouring countries. The Bank therefore is proposing a study of Asia's acid rain and greenhouse gas threat to identify the main producers.

Ms. Gloria Davis, chief of the Environment Division of the World Bank's Asia region, says that while emissions which contribute to acid rain and global warming are of widespread concern in North America and Europe, the situation in Asia has received little attention and potentially could be much worse. ■

Military Conversion for Developing Countries

There is a tendency to think of developing countries mostly as victims of the global arms trade: as buyers of foreign weaponry and as proxies for ideological disputes which the suppliers would rather not wage on their home turf. There is ample evidence to support this view, but the picture of developing countries as victims and innocents is a rather narrow vision of a broad and complex issue, and one which has been blurred by the expanding capacity of developing countries to manufacture weapons of mass destruction. The production and export of arms has become a significant element in the economies of several developing countries which have sought and found a lucrative South-South trade in sophisticated military hardware.



UNEP

A buyers' market

This is not to say that North-South traffic in arms is eroding. Far from it. There is also a very real prospect that as the rationale for self defence in Europe, North America, the Soviet Union and elsewhere, becomes more difficult to sustain, arms manufacturers, supported by their Governments will discount wares to the third world in order to hold their market share. Today, however, these principal suppliers also have competition from developing countries including India, China, Egypt, Indonesia, South Korea, Taiwan and Brazil, who produce a broad range of major weapons systems under international licensing agreements. As one recent report by the Office of Technology Assessment of the Congress of the United States stated: "The multiplicity of sources of supply has produced a buyers' market in which modern tanks, artillery, fighter aircraft, missiles, submarines and other weapons are generally available to any nation that can pay for them."

How can industrialized and developing countries cope with these trends? How can the international community and the United Nations translate a more favourable global political climate into an active policy of disarmament for the developing as well as the industrialized countries?

These were just a few of the questions confronting delegates who attended a conference at Beijing (22-26 October) on the subject of "International Cooperation in Peaceful Uses of Military Industrial Technology". The conference was organized by the China Association for Peaceful Use of Military Industrial Technologies with the support of CSTD.

China's solution

Chinese experts noted, among other things, that the conversion of military operations to peacetime purposes had permeated the entire national economy from the level of high technology exports to cooperation in domestic production at local government level. It was said that the annual output and value of commercial products generated by China's military complex in the past decade had grown at an average rate of 10 per cent a year. It was noted that China's 'solution' to the challenges of conversion had been to combine military and civilian production. The Chongqing military industrial complex was said to have set up 117 production lines for civilian goods which now accounted for 75 per cent of the value of the industrial output. All had a strong processing and design capacity which had led to the development of more than 200 civilian products ranging from optical goods and home appliances, to microelectronic, telecommunications and transportation equipment.

Dr. Lutz Baehr, Director of CSTD, said that military industries in developed and developing countries operated under conditions of extreme privilege. They enjoyed government subsidies and other special attention and were not subjected to competitive markets. Military products were usually "sold" before they were produced, he said. In developing countries, these conditions were

(Cont. next page)

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even more pronounced, with military economies operating as "islands" of efficiency, modernity and sophistication, segregated from other production and immune to power shortages or other disruptive factors. The military labour force, likewise, usually enjoyed higher salaries and job security.

Dr. Baehr said, however, that while developing countries had some advantages in the conversion process, they also faced disadvantages which industrialized countries did not share.

"In general, military producers in developing countries tend to be in a better position to identify alternative products," he said. "Their military industries stand for modern and sophisticated production, skilled labour, scientific and technological expertise. In the process of conversion they can open new opportunities for the civil sector. They can become vehicles for high-tech development.

"However, at the same time, developing countries normally do not have adequate institutional structures to make the best use of the scientific and technological expertise available in military production. Subsequently, the shift from military to civilian production appears to be more difficult than in the industrialized countries."

Conference participants noted that developing countries would need help to make this transition and that international cooperation could play a crucial role through research partnerships, arrangements with foreign companies, and bilateral as well as multilateral development cooperation. The aim of the international community, they said should be to build the scientific, technological and managerial capacity of developing countries to realign their military capabilities.

It was suggested that international cooperation include arms-related trade arrangements and regulations, and the transformation of existing bilateral programmes of military assistance into bilateral development programmes which are specifically designed to facilitate this transition. It was agreed that the United Nations has a crucial role to play in propagating a new concept of cooperation. As the Secretary General of the UN has said: "What is needed, is a formula for cooperation involving greater willingness by the industrialized countries to meet the needs of developing countries for science and technology for peaceful purposes, coupled with genuine openness among recipients, about their end use." ■

South Asia Geological Congress

The first South Asia Geological Congress will be held at Islamabad, Pakistan, from 23-27 February as a platform for exchanges between earth scientists in the region

The GEOSAS-1 symposium will cover the interests of Turkey, Iran, Pakistan, India, Nepal, Bhutan, Bangladesh, Maldives and Sri Lanka, which form a geographic and geological entity covering a land surface of 7 million square kilometres inhabited by more then 1 billion people.

The objectives of the symposium are to:

- exchange ideas and discuss common geological problems with international experts;
- increase the competence of participating countries to exploit their resources in environmentally sustainable ways;
- explore avenues for regional trade in geological commodities;
- attract investment for geological exploration;
- help train earth scientists in the region.

The symposium is being organized by Pakistan's Ministry of Petroleum and Natural Resources.

For further information please write to Mr. Hilal A. Raza, Secretary General of GEOSAS-1, PO Box 1308, Islamabad 44000, Pakistan. Telefax: (92-51) 828773. ■

European International Space Year

The space instruments, systems and data which are now part of our everyday lives, will be the focus of an International Space Year Conference to be held at Munich, Germany, from 30 March – 4 April.

The aim of the conference, which was endorsed by the United Nations General Assembly two years ago, is to:

- demonstrate the practical uses of space-based information for environmental monitoring and protection, resource management, transportation and other purposes;
- enhance international scientific cooperation in space research and applications for the benefit of mankind;
- stimulate interaction between different space disciplines;
- present European contributions to global change research, using space technologies;
- promote education and training in space applications.

The conference is being jointly organized and sponsored by the Services of the Commission of the European Communities (CEC), European Space Agency (ESA) and the German Space Agency (DARA).

For further information, please write to B. Pfeiffer, ESA/ESTEC - ISY Office, Keplerlaan 1/PO Box 299, 2200 AG Noordwijk, the Netherlands. Telefax: (31) 1719 14642. ■

China Moves to Hold Urban Pollution in Check

With China's rapid economic expansion, coal-fired pollution is unlikely to abate rapidly. The country does not have the resources for an immediate overhaul of the energy system and is relying instead on a combination of environmental management and rational energy use to achieve social, environmental and economic benefits simultaneously.

Constrained as it is by resources and the fragmented nature of energy supply (50 per cent of the urban population draws home heating from small individual boilers and 44 per cent cook on small coal-fired stoves), the approach is making some identifiable inroads on the problem.

Between 1980 and 1985, China's industrial production grew by 65 per cent and coal consumption by 34 per cent, but according to national reports, the rising level of emissions in some urban areas was arrested by a combination of affordable measures which included stronger environmental management, incentives for energy savers, the use of sulphur-fixing coal briquettes, circulating fluidized bed combustion boilers, co-generation of power and heat, centralized city heat and gas supply, and the use of industrial waste heat and coal mine gas.

Briquettes

In the city locations covered, briquettes for public and industrial consumption produced the same energy using 30 per cent less coal. When compared with the direct burning of raw coal, emissions of CO_2 were cut by as much as 80 per cent. When sulphur fixing agents are added, the SO_2 output could be reduced by up to 50 per cent.

Fluidized bed combustion

It is projected that the use of circulating fluidized bed combustion in small- and medium-sized boilers with a capacity of 4 to 75 tons per hour could cut coal use by 26 per cent, and reduce SO_2 and NO_2 emissions by 75 per cent.

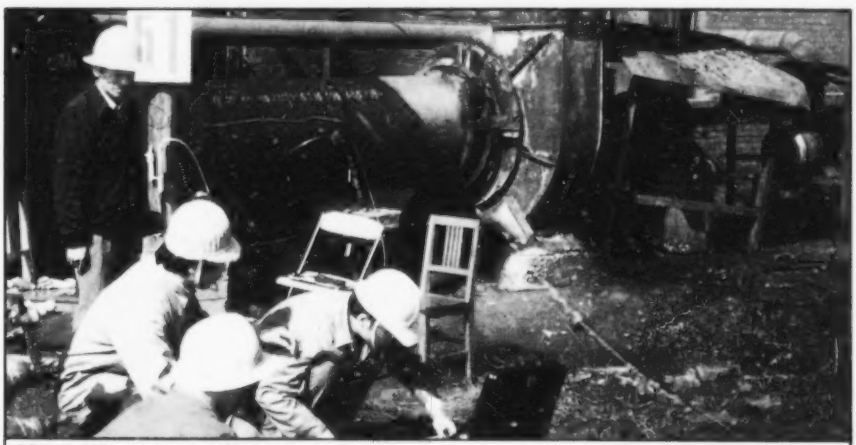
Central heating

The number of city residents with heating supplied through community services grew three-fold between 1980 and 1985 in 30 northern cities. These community distribution systems use coal gas, waste industrial heat and co-generation, but covered only 5.7 per cent of the buildings. It was estimated however that these steps in 1985 alone saved 1.3 million tons of coal and reduced SO_2 and smoke emissions by 49,000 tons and 72,000 tons respectively.

Two 25 MW generators at the Shenyang power plant, which were refitted as heat and co-generation units, took the place of 205 heat supply boilers. It has been estimated that the savings of coal, electricity and personnel from this measure in one heating season amounted to 100,000 tons, 800,000 kWh and 1,670 work-days, respectively. All told, the savings covered about 25 per cent of the total investment without counting the benefits to the environment.

Demonstrated potential

The potential benefits from replication of these initiatives are extraordinary, but in the meantime most of the coal-fired facilities which generate power for China's industry or provide household heat and cooking continue to burn fuel inefficiently. Most of the coal is unprocessed and relatively few of the industrial or domestic facilities which consume it have effective control over emissions. In 1988, only 17.2 per cent of the 983 million metric tons of coal consumed nationwide was processed. ■



GTZ

Measuring plant efficiency - China

This article draws on a report to the Clean Coal Conference (Beijing, December 1991) prepared by Zhao Dianwu of the Research Centre for Eco-Environmental Sciences, Academia Sinica, and Wu Baozhong of the National Environmental Protection Agency of China.

For further information, contact:

Centre for Science and Technology for Development
United Nations
New York, New York 10017
United States of America
Telephone: (212) 963-8435
Fax: (212) 963-1267

Update and ATAS News
Edited by Ian Steele

"... A periodic newsletter to keep national authorities, United Nations organizations and intergovernmental and non-governmental organizations informed of the progress made and related developments regarding the implementation of the Vienna Programme of Action" (IGC resolution 5(II)).

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